Uniqueness and computation of equilibria in resource allocation games

Propositions (Stellingen)

Accompanying the thesis

Uniqueness and Computation of Equilibria in Resource Allocation Games

by

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1. Uniqueness of equilibria is not uniquely defined. Equilibria can be unique up to player-specific load vectors, global load vectors, player-specific costs or social cost. (Chapter 2)

2. Proofs that show that pure Nash equilibria exist do usually not lead to efficient algorithms that can actually find them. (Chapter 3)

3. Let x be the unique equilibrium of an atomic splittable singleton game $\mathcal{G}$. Then, there exists a packet size k such that x is also the unique equilibrium for the k-integral splittable game $\mathcal{G}_k$. (Chapter 3)

4. In atomic splittable congestion games with convex cost functions, one can construct an approximate equilibrium in which no player can decrease her cost by more that ε, though, there is no guarantee that the corresponding load vectors resemble those in an atomic splittable equilibrium. (Chapter 4)

5. Resource allocation games appear in many shapes and forms. We study drivers avoiding congestion; optimal production rates in oligopolistic competition; and birds fighting over berries using the same model.

6. In algorithmic game theory, we find strategy profiles that deal with the selfish behaviour of many players at once, on our own.

7. In order to think outside the box, one should leave it regularly. Go outside.

8. When playing card games with friends, the objective is not to win, but to tease the other players in the process.

9. In daily life, things often look more complex than they are. In research, things are often more complex than they look like.

10. When facing a challenge, act brave and determined. *A real 'Timmermans' doesn't sweat.'* - Dad